BULLETIN OF THE AMERICAN MATHEMATICAL SOCIETY

CONTENTS JANUARY 1992

Research-Expository Papers

Editors' remarks *by Morris W. Hirsch and Richard S. Palais* 1
Some basic information on information-based complexity theory *by Beresford N. Parlett* 3
Perspectives on information-based complexity *by J. F. Traub and H. Woźniakowski* 29
Semilinear wave equations *by Michael Struwe* 53
Λ-Trees and their applications *by John W. Morgan* 87

Research Announcements

Lifting of cohomology and unobstructedness of certain holomorphic maps *by Ziv Ran* 113
A steepest descent method for oscillatory Riemann-Hilbert problems *by P. Deift and X. Zhou* 119
Nonunique tangent maps at isolated singularities of harmonic maps *by Brian White* 125
Semistability of amalgamated products, HNN-extensions, and all one-relator groups *by Michael L. Mihalik and Steven T. Tschantz* 131
Some non-analytic-hypoelliptic sums of squares of vector fields *by Michael Christ*. 137
Pleating coordinates for the Teichmüller space of a punctured torus *by Linda Keen and Caroline Series* 141

Book Reviews

Weak convergence methods for nonlinear partial differential equations *by Lawrence C. Evans*—**Reviewed by** *Michel Chipot and David Kinderlehrer* 147
Finsler geometry and applications *by Aurel Bejancu*—**Reviewed by** *Hanno Rund*.. 148
Unbounded operator algebras and representation theory *by Konrad Schmüdgen*—**Reviewed by** *Palle Jorgensen* 152
Topics in Nevanlinna theory *by Serge Lang and William Cherry*—**Reviewed by** *Paul Vojta* 153
Set-valued analysis *by Jean-Pierre Aubin and Helene Frankowska*—**Reviewed by** *Jonathan Borwein* 157
Large deviation techniques in decision, simulation, and estimation *by James A. Bucklew*—**Reviewed by** *Richard S. Ellis* 160
Handbook of differential equaitons *by Daniel Zwillinger*—**Reviewed by** *Ray Redheffer* 171
Retarded dynamical systems: stability and characteristic functions *by G. Stépán*—**Reviewed by** *Kenneth L. Cooke* 175
Classsification theories of polarized varieties *by Takao Fujita*—**Reviewed by** *Andrew J. Sommese* 179
The geometry and physics of knots *by Michael Atiyah*—**Reviewed by** *Raoul Bott* . 182
Variational principles of topology. Multidimensional minimal surface theory *by Anatoliĭ T. Fomenko*—**Reviewed by** *Fred Almgren* 188
Induced modules over group algebras *by Gregory Karpilovsky*—**Reviewed by** *Gerald Cliff* 193

Research-Expository Papers

Cardinal arithmetic for skeptics *by Saharon Shelah* 197
Algorithms in Algebraic Number Theory *by H. W. Lenstra, Jr.* 211

Research Announcements

A general correspondence between Dirichlet forms and right processes *by Sergio Albeverio and Zhi-Ming Ma* 245
Ramanujan duals and automorphic spectrum *by M. Burger, J. S. Li, and P. Sarnak* 253
The A_ℓ and C_ℓ Bailey transform and lemma *by Stephen C. Milne and Glenn M. Lilly* 258
A theory of algebraic cocycles *by Eric M. Friedlander and H. Blaine Lawson, Jr.* . 264
Nilpotent orbits, normality, and Hamiltonian group actions *by Ranee Brylinski and Bertram Kostant* 269
Analytic varieties versus integral varieties of Lie algebras of vector fields *by Herwig Hauser and Gerd Müller* 276
A period mapping in universal Teichmüller space *by Subhashis Nag* 280
The Mackey-Gleason problem *by L. J. Bunce and J. D. Maitland Wright* 288
A sharp pointwise bound for functions with L^2-Laplacians on arbitrary domains and its applications *by Wenzheng Xie* 294
Spectral theory and representations of nilpotent groups *by P. Levy-Bruhl, A. Mohamed, and J. Nourrigat* 299
A combinatorial formula for the Pontrjagin classes *by I. M. Gelfand and R. D. MacPherson* 304
Higgs line bundles, Green-Lazarsfeld sets, and maps of Kähler manifolds to curves *by Donu Arapura* 310
A quasi-polynomial bound for the diameter of graphs of polyhedra *by Gil Kalai and Daniel J. Kleitman* 315
The Atiyah-Jones conjecture *by C. P. Boyer, J. C. Hurtubise, B. M. Mann, and R. J. Milgram* 317
Density theorems for sampling and interpolation in the Bargmann-Fock space *by Kristian Seip* 322

Book Reviews

Critical point theory and submanifold geometry *by Richard S. Palais and Chuulian Terng* **and Critical point theory and Hamiltonian systems** *by Jean Mawhin and Michel Willem*—**Reviewed by** *M. S. Berger* 329
Capacity theory on algebraic curves *by Robert S. Rumely*—**Reviewed by** *Ted Chinburg* 332
Nonlinear elliptic and evolution problems and their finite element approximations *by A. Ženišek*—**Reviewed by** *M. Dobrowolski* 336
Finite automata, their algebras and grammars: Towards a theory of formal expressions *by J. Richard Büchi*—**Reviewed by** *Howard Straubing* 340
Vector Lyapunov functions and stability analysis of nonlinear systems *by V. Lakshmikantham, V. M. Matrosov, and S. Sivasundaram*—**Reviewed by** *T. A. Burton* 344

Walsh series and transforms *by Golubov, Efimov, and Skvortsov*—**Reviewed by** *W. R. Wade* 348
Nonlinear wave equations *by Walter A. Strauss*—**Reviewed by** *Cathleen S. Morawetz* 360
Homological questions in local algebra *by Jan R. Strooker*—**Reviewed by** *Craig Huneke*..... 361
Geometry of Banach spaces, duality mappings and nonlinear problems *by Ioana Cioranescu*—**Reviewed by** *Simeon Reich* 367